

PROJECT INFORMATION

Project Title	Performance of Snow & Ice Plows
ID	ICT-R27-094
Project Cost	\$338,709.00
Duration	50 Months (09/01/2011 to 11/30/2015)
SUBMITTER	
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RESEARCH PROGRAM	
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RESEARCH AND RESULTS	
Brief Summary of the Research Project	<p>Removal of ice and snow from road surfaces is a critical task in the northern tier of the United States, including Illinois. Highways with high levels of traffic are expected to be cleared of snow and ice quickly after each snow storm. This is necessary for maintaining the safety of the public and the efficiency of the highway system. In 2011, the Illinois Department of Transportation (IDOT) initiated a research project to conduct a comprehensive study to evaluate the performance of snow and ice plows. The project targeted several plow performance indicators including blade type, scraping forces, and shock acceleration, among other suggested parameters.</p> <p>The project involved a literature review, a synthesis of best practices in snow and ice plowing operations, development of a plow and blade performance evaluation procedure, instrumentation of a snow plow and associated field tests, development of finite element models to synthesize a comprehensive performance database, and documentation of project results.</p>
Impact, or Potential Impact, of Implementing Research Results	<p>In this project, the research team achieved the following:</p> <ol style="list-style-type: none"> 1. Existing information in literature pertaining to best practices in snow and ice control was collected and presented. 2. A survey of best practices in snow and ice control was administered to a number of snow and ice control professionals from around the country. The interviews generated a number of recommendations with respect to effective snow and ice control. The summary of results was shared by IDOT personnel during outreach trainings with local agencies throughout the state. 3. A plow instrumentation plan and a data collection strategy were developed and implemented. The instrumentation plan included the use of strain gauges and GPS enabled video cameras to capture snow and ice plowing activities in their totalities. The data collection took place during actual snow storms under different weather conditions and patterns allowing for an adequate

variability in considered parameters.

4. The data collection effort included the use of a video camera to capture the interaction between the plow and the pavement during a dry run to study the effect of stresses and wear comparing different blades on concrete and asphalt pavements (See Figure 36 Carbide insert blade on asphalt pavement & Figure 37 Carbide insert blade on concrete pavement).



Figure 36. Carbide insert blade on asphalt pavement.



Figure 37. Carbide insert blade on concrete pavement.

5. The research team developed a finite element model of an Alaska front plow and an underbody scraper. The models were used to simulate plow behavior and estimate the loads acting on it by matching measured-to-computed stresses (See attached Fig 38 3D Front Plow Model).

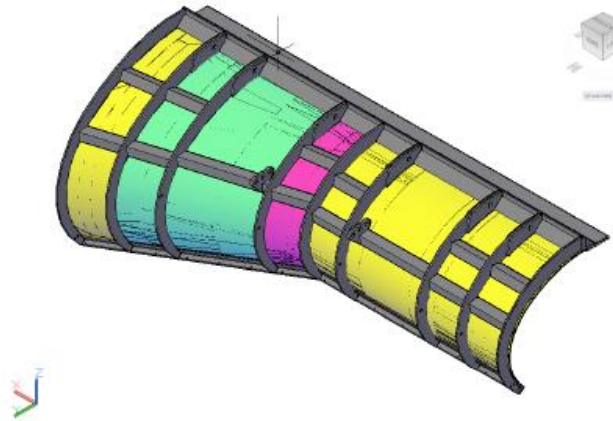


Figure 38. 3D front plow model.

Tim Peters, the research project chair and IDOT's Local Policy and Technology Engineer stated "The study was useful in developing snow and ice training I presented to local agencies throughout the state. Local agencies often were not familiar with the different types of plow blades that are available and the advantages they offer. In addition, this study collected and summarized best practices in snow and ice operations in general. The information on best practices and blades from this report was a major source of information for the training I provided."

The findings of the report were shared with all thirty-two states participating in the -Clear Roads Transportation Pooled Funds. Rick Nelson, Director of AASHTO's Snow and Ice Cooperative Pooled Fund (SICOP) also featured the report on their website (see attached email) in order to share IDOT's results with the entire country.

Web Links (if available)

<https://apps.ict.illinois.edu/projects/getfile.asp?id=3692>

ATTACHMENT